Control of basic fibroblast growth factor release from fibrin gel with heparin and concentrations of fibrinogen and thrombin

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Abstract

Basicfibroblast growth factor (bFGF) has been known to stimulate the regeneration of a number of tissues including cartilage, nerve, skin, liver, and blood vessel. Delivery of bFGF for a long term at a controlled concentration would maximize the stimulative effects. The present study demonstrates that kinetics of bFGF release from fibrin gel can be controlled with heparin and concentration of fibrinogen and thrombin. The addition of heparin to fibrin gel significantly decreased the bFGF release. As the thrombin content in the fibrin gels increased, the bFGF release rate significantly decreased. Increased fibrinogen concentration decreased bFGF release. The bioactivity and stability of bFGF released from fibrin gels were assessed using human dermal fibroblast cell culture. Basic FGF released from fibrin gels stimulated human dermal fibroblast growth, indicating that the bFGF released from fibrin gels was in a bioactive form. Basic FGF released from fibrin gels exhibited significantly higher extents of fibroblast growth than bFGF daily added in a free form into culture medium, suggesting that bFGF released from fibrin gels is more stable than bFGF in a free form. Basic FGF release controlled with heparin and concentration of fibrinogen and thrombin could increase its ability in tissue regeneration.

References

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